

We claim:

1. A method for treating polychlorinated biphenyl (PCB)  
5 contaminated media comprising the steps of:
  - a) combining said media with a fluid containing one or more liquid hydrocarbons to form a media/fluid mixture;
  - b) sonicating said mixture at audio frequency to extract PCB from the media into the fluid; and
  - 10 c) treating said fluid with sodium-containing alkali metal.
2. The method of claim 1 including the additional steps of heating said slurry prior to and during said sonicating  
15 step.
3. The method of claim 1 wherein said media is soil.
4. The method of claim 1 wherein said media is ballast  
20 residue such as tar or pitch.
5. The method of claim 1 wherein said fluid contains a mixture of water and one or more liquid hydrocarbons.
- 25 6. The method of claim 1 wherein said liquid hydrocarbons include kerosene.
7. The method of claim 1 including the additional step of reducing the particle size of said media prior to said  
30 combining step, said reducing step being one or more of sieving, comminuting and pulverizing said media.
8. The method of claim 1 including the additional step of air-drying said media prior to said combining step.

9. The method of claim 1 wherein said treatment step takes place during said sonication step and said sonication step occurs at a temperature sufficient to melt said sodium-containing alkali metal.
10. The method of claim 9 wherein said sonication step occurs in a sealed vessel with a vent to release gas during sonication.
11. The method of claim 9 wherein said sonication step occurs in a vessel with one or more inlets and outlets able to transfer said media/fluid mixture between said vessel and a pump-equipped reservoir.
12. The method of claim 11 wherein said sonication step further includes using inert gas to purge the head space of said reservoir and said sonication vessel.
13. The method of claim 11 further including the step of transferring said sonicated media/fluid mixture of from one of said sonication vessel and said reservoir to a settling tank to separate sonicated liquid and sonicated media.
14. The method of claim 13 including an additional step of sonicating said separated sonicated fluid in the presence of sodium containing alkali metal and at a temperature sufficient to melt sodium containing alkali metal.
15. The method of claim 13 including the additional step of treating said separated sonicated media with water in a flotation cell to dislodge residual PCB-containing

hydrocarbon liquid and froth from said separated  
sonicated media.

16. The method of claim 15 wherein said flotation cell  
5 treated soil is recycled to the environment.
17. The method of claim 15 wherein said flotation water  
separated from froth, media and hydrocarbon containing  
liquid is recycled to the environment after pH  
10 adjustment.
18. The method of claim 15 wherein said froth is recycled and  
used as part of said fluid in said method.
- 15 19. The method of claim 15 wherein said floatation cell  
includes a frothing agent.
20. The method of claim 15 wherein said floatation cell  
includes pH adjustment with sodium carbonate.
- 20 21. The method of claim 1 wherein said sonication step  
includes the addition of lime to said mixture.
22. The method of claim 21 wherein said sonication step is  
25 repeated using said lime-sonicated media and a sodium-  
containing alkali metal at a temperature sufficient to  
melt sodium.
23. The method of claim 22 wherein said sonication steps  
30 occur in a sealed vessel able to be vented to release gas  
during sonication.

24. The method of claim 14 wherein said treated separated sonicated fluid is recycled for use as said fluid in said method.
- 5 25. The method of claim 1 wherein said sonicating step uses sonication equipment without grinding media.
26. The method of claim 1, wherein said sonicating step occurs in a temperature range of 100-120 °C.
- 10 27. The method of claim 5, wherein said sonicating step occurs in a temperature range of 80-98°C.
28. The method of claim 1, wherein said sonicating step uses  
15 a resonating probe contacting said fluid.
29. The method of claim 1, wherein said sonicating step takes place in one or more chambers mounted axially to a resonating member.
- 20 30. The method of claim 1, wherein said liquid hydrocarbons contain one or more hydrocarbon subcomponents which are not liquids at sonication temperature.
- 25 31. The method according to claim 4, wherein said sonicating step occurs at a minimum temperature of 100°C.
32. The method according to claim 1, wherein said sodium-containing alkali metal is commercially pure sodium  
30 metal.
33. An apparatus for treating polychlorinated biphenyl (PCB) contaminated media, comprising:

- a) a reaction vessel for holding a mixture of said media and a liquid hydrocarbon-containing fluid;
- b) a sonicator without grinding media for sonicating said mixture at an audio frequency; and
- 5 c) a heater for controlling the temperature of said mixture.

34. The apparatus of claim 33, wherein said sonicator uses a resonating probe contacting said fluid.

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35. The apparatus of claim 33, wherein said reaction vessel consists of one or more chambers mounted axially to a resonating member of said sonicator.

15 36. The apparatus of claim 33, wherein said reaction vessel includes vents to release gas during sonication.